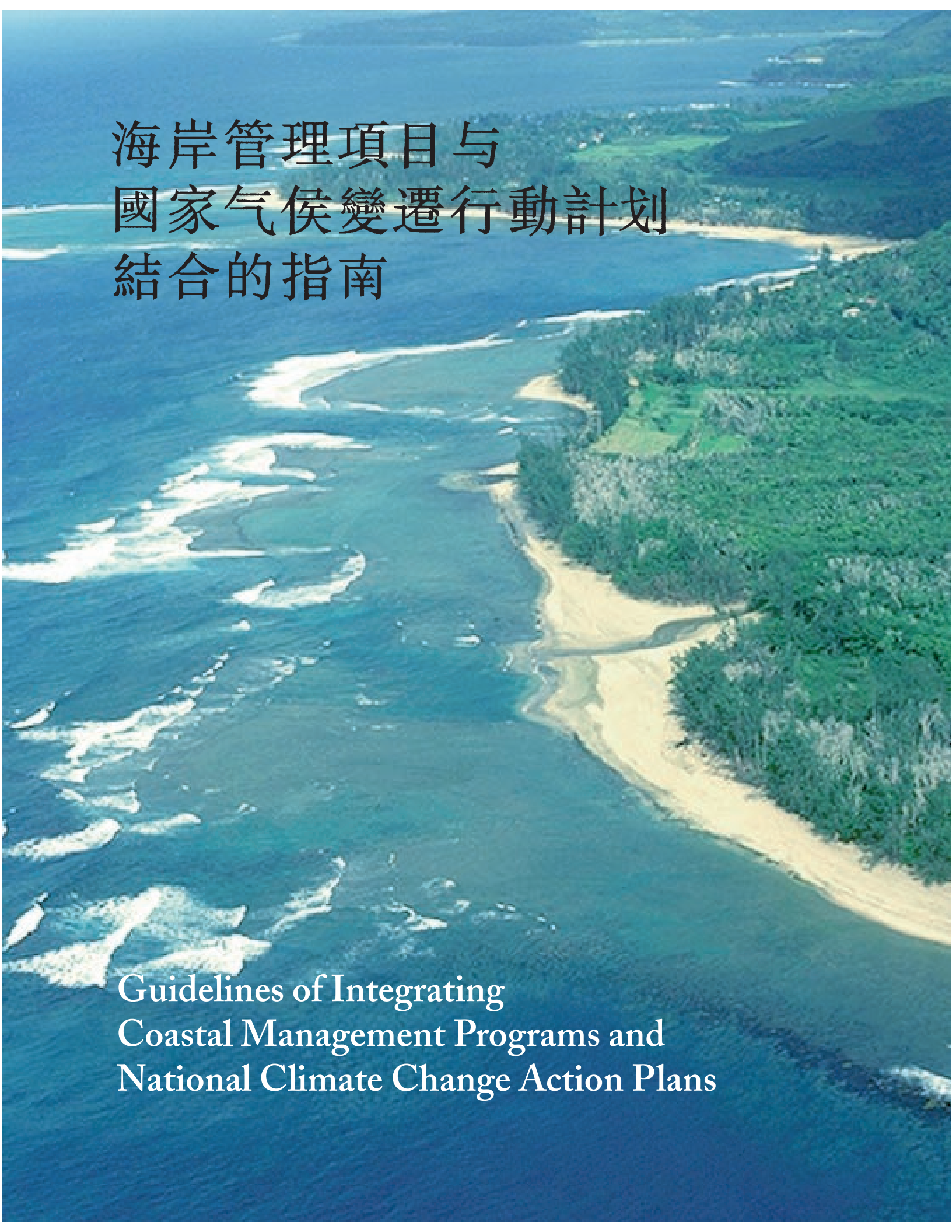

海岸管理項目与國家气侯變遷行動計划結合的指南

Guidelines of Integrating Coastal Management Programs and National Climate Change Action Plans

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Guidelines for Integrating Coastal Management Programs and National Climate Change Action Plans

Developed at the International Workshop: Planning for Climate Change Through Integrated Coastal Management

February 24–28, 1997
Chinese Taipei

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In response to potential commitments and obligations under the United Nations Framework Convention on Climate Change (UNFCCC), many nations have conducted their climate change country studies and are preparing national climate change action plans that identify management strategies to reduce greenhouse gas emissions and adapt to the potential impacts of long-term climate change. The successful implementation of these plans and their management strategies within individual countries will depend to a large measure on the extent of their integration into the implementation of other national and sectoral management plans, including coastal management plans. This document provides guidance on integrating coastal management programs and national climate change action plans.

Contents

Introduction

The world's coastal areas and small islands are highly vulnerable to climate change. Low-lying delta and barrier coasts and low-elevation reef islands and coral atolls are especially sensitive to rising sea level, as well as to changes in rainfall, storm frequency, and intensity. Inundation, flooding, erosion, and saltwater intrusion are only a few of the potential impacts of climate change (IPCC, 1992). Sea-level rise could have negative effects on a number of sectors, including tourism, freshwater quantity and quality, fisheries and aquaculture, agriculture, human settlements, financial services, and human health.

Adapting to sea-level rise and other effects of climate change will involve important trade-offs that weigh environmental, economic, social, and cultural values. Effects will depend not only on the local patterns and intensity of climate change, but also on the nature of the local coastal environment, on the human, ecological, and physical responsiveness of the affected coastal system, and on actions in other sectors of coastal and national economies. Given the long time frames involved in reducing the magnitude of global warming, it is vital that steps be taken now to manage the impacts that almost certainly will occur in islands and low-lying coastal areas.

The recommended framework for coastal management under these dynamic climate conditions is integrated coastal management, or ICM (IPCC, 1994). However, the capacity for undertaking ICM is either weak or nonexistent in many coastal nations and needs to be strengthened. This point is particularly important because ICM has also been suggested as an appropriate framework to meet the commitments and obligations of other recent international agreements and initiatives, including: (1) Chapter 17 of Agenda 21, adopted at the United Nations Conference on Environment and Development in 1992 (UNCED); (2) the 1992 United Nations Convention on Biological Diversity, which adopted the Jakarta Mandate on Coastal and Marine Biodiversity and identified coastal area management as the national approach to meet the obligations of the convention; (3) the 1994 Global Conference on Sustainable Development of Small Island States (SIDS); (4) the 1995 Intergovernmental Conference on Land-Based Sources of Marine Pollution, which adopted the Washington Declaration, including the Global Program of Action for the Protection of the Marine Environment from Land-based Activities; and (5) the International Coral Reef Initiative (Cicin-Sain, Knecht, and Fisk, 1995).

ICM is a continuous, iterative, adaptive, and consensus-building process comprised of a set of related tasks, all of which must be carried out to achieve a set of goals, including adapting to the effects of climate change (Bower, Ehler, and Basta, 1994). The dimensions of ICM include:
n Integration of policies and programs across and among sectors of the economy—e.g., economic development, transportation, recreation, and agriculture.

- Integration among agencies involved in coastal management at all levels of government, including both vertical (national, subnational, and local) and horizontal (across the same level of government) integration.
- Integration between public- and private-sector management activities.
- Integration between management actions that affect the land and water environments of coastal areas, and areas upstream and upwind of coastal areas.
- Integration among the disciplines of coastal management, including ecology, economics, engineering, and political science.

Experts from many coastal states have exchanged their experiences and views through a number of regional and global workshops to prepare their national action plans and subsequent national communications to be submitted to the UNFCCC. The following set of principles and recommendations, assembled through these workshops, can serve as a guide for coastal nations to implement or strengthen an ICM program, and simultaneously meet the obligations of international agreements that have a special focus on the management of coastal areas and the related implications of climate change.

1 Principles for Integrated Coastal Management

Two broad categories of principles useful for formulating and managing ICM programs are: (1) principles based on agreed international norms on environment and development that have emanated from UNCED (Rio, 1992) and other international agreements, and (2) principles related to the special character of coasts and oceans.

1.1 Principles Related to Environment and Economic Development

These principles include those found in the Rio Declaration of Principles and in other international agreements, such as UNFCCC, the Convention on Biological Diversity, the Washington Global Program of Action, and the Law of the Sea Convention. They include the principle of inter- and intragenerational equity, the principle of the right to develop, the precautionary principle, the polluter-pays principle, and the principle of openness and transparency.

Overarching all of these are the goal of "sustainable development" and the principle of "integration," which addresses the interrelationships—or interdependence—among issues and sectors, and between environment and economic development. In contrast to past thinking and practice, environmental protection and economic development cannot be considered separately; rather, each should incorporate the other.

1.2 Principles Related to the Special Character of Oceans and Coasts

The work of Cicin-Sain and Knecht (1997), and USCSP (1995, 1996, 1997), and earlier work by Clark (1992), Van Dyke (1992), Archer and Jarman (1992), and Cicin-Sain and Knecht (1988, 1992) provide guidance for developing ICM programs. They include two main categories of principles that capture the essence and uniqueness of oceans and coasts: (1) principles related to the biophysical nature of coastal areas and (2) principles related to the public nature of the ocean and to the use of coastal/ocean resources and space. Following are the overarching themes of these two categories:

- Coastal areas are distinctive resource systems that require special management and planning approaches. Besides being extremely productive, the major resource systems of the coast and coastal habitats (such as coral reefs and mangrove forests) provide buffers against storms and high seas and filter the pollutants between the land and the ocean.

- Water is the major integrating force of coastal resource systems. Because it operates at the land–water interface, ICM relates to water in several ways, whether facilitating marine commerce, mitigating the ravages of sea storms, conserving resources, or abating pollution. The water influence not only establishes special conditions, but also dictates unusual and complex institutional arrangements.

- The significant interactions that take place across the land–water boundary require recognizing and managing the whole system (upland, shore land, intertidal area, and near-shore waters) as an integrated unit.

• Activities well inland of the coast—both within the coastal nation's adjacent jurisdictions and in adjacent nations—can significantly affect coastal resources. Where transboundary problems occur, cooperative efforts within and among nations will often be necessary to address them effectively, efficiently, and equitably.

1.2.1 Principles related to the biophysical nature of the coastal zone

• The high mobility and interdependence of ocean resources and processes, including the exploitation of non-living resources, make traditional land-based management approaches unsuitable for managing coastal areas.

• Care should be taken to conserve and maintain salt marshes, coral reefs, and other coastal habitats in their natural condition. Land forms fronting on the water's edge (sand dunes, beaches, mangroves and other forests, fringing reefs, and headlands) play a key role as buffers to erosion and sea-level rise and contribute to long-term sustainability. Their resilience should be maintained to enable their adaptation to fluctuations in climate and other changes. Understanding the underlying natural coastal processes is essential to maintaining these ecosystems.

• Efforts to stabilize the coast and to provide infrastructure and facilities should emphasize "designing with nature," such as using special vegetation instead of physical structures for erosion control, when appropriate.

• Interruption in the natural longshore drift system should be minimized.

• The biodiversity of rare and fragile ecosystems and endangered and threatened species should be protected.

• Where retreat is being considered as an adaptation strategy, efforts should be made, wherever possible, to create migration paths for habitats and coastal species that otherwise might be lost.

1.2.2 Principles related to the public nature of the ocean and to the use of coastal/ocean resources and space

• Many countries have traditionally considered ocean resources to be part of the public domain, not owned exclusively by any one group or people. These nations base their management of ocean and coastal resources on a stewardship ethic and their resolution of multiple-use conflicts on fairness and equity.

• However, in some nations, community-, village-, or kinship-based systems govern reef tenure and ownership of coastal/ocean resources. Wherever possible, historically based claims of indigenous peoples to coastal/ocean space and ocean resources should be recognized, and their practices of living in harmony with ocean resources should be followed.

• In general, protecting living resources and their habitats should be given priority over exploiting nonliving resources, nonexclusive uses should be preferred over exclusive uses, and reversible exclusive uses should be preferred over non-reversible exclusive uses. Requiring a carefully prepared environmental impact assessment for each proposed development project could greatly assist in setting such priorities.

• Potential conflicts should be identified early and in an orderly fashion, and equitable solutions should be developed by processes that protect and enhance public order. In decision making, consensus should be employed whenever possible. Full involvement of coastal communities is important in the entire ICM

process, including planning, implementation, monitoring, and evaluation.

• New developments in coastal areas that are marine- or saltwater-dependent should have priority over those that are not.

• The transboundary nature of some coastal and marine problems may require cooperation within or among countries. These include problems related to longshore drift and associated pollution and basin management problems.

• Recent assessment studies on climate change have found that impacts in the coastal zone (such as increased erosion, flooding, and saltwater intrusion) are best managed within the framework of an ICM program. Effective strategies for adapting to climate change integrate ICM with the other major building blocks of national climate change action plans.

2 Improving the Scientific and Information Base for ICM

Any given coastal management context contains uncertainties about various aspects of the coastal system. These include future trends of climate change and sea-level rise, inadequate data on land use and how technology affects pollutant discharges, the behavior of activities in response to management actions, and the effects of discharges of pollutants and habitat changes. An integral component of an ICM action plan should be a data collection, assessment, and directed research program that develops, as inputs to the next round of analysis and planning, information that reduces such areas of uncertainty.

2.1 Scientific and Information Components of ICM

Reliable data are required for the entire ICM process—i.e., to understand and analyze the present state of the coastal environment, to prepare ICM action programs and evaluate their performance, to understand the resilience and vulnerability of the coastal systems to climate change and sea-level rise, and to formulate effective response strategies. Though collecting and processing data are essential to successful ICM programs, many countries lack the resources for these activities.
Following are the basic scientific and information components of a successful ICM program:

• Identification of first-priority data (environmental indicators) is a prerequisite to data collection. The set of data indicated in the IPCC Vulnerability Assessment Common Methodology can be used as a good example for this step (IPCC, 1991).

• Sites investigated under climate change and ICM programs should be monitored both before and after implementation of coastal management projects. The former should serve the general purpose of data collection and selection, while the latter should report the lessons learned from the program's successes and failures.

• Collection of physical, chemical, biological, socioeconomic, and cultural data appearing in ICM and climate change studies is an essential component of an ICM program. Data should be collected consistently and coherently—both before and after implementation of coastal management projects—with a set of measurements and parameters clearly assigned to their locations.

Data collection is a serious problem in many developing countries, where knowing where and how to find different types of data continues to be a serious obstacle. For example, when simple topographic maps are not readily available, airborne video techniques can be used for specific areas, but should not be regarded as a general remedy for the lack of data. For this reason, outside experts should always repatriate the data they have collected from developing countries.

• The data collected should be fed back to the planning phase of the ICM process, to allow coastal managers to evaluate the effectiveness of the adaptive strategies.
n Databases should be arranged, structured, and formatted systematically—possibly GIS-aided and/or in a GIS environment. Meta-information databases (i.e., of regional and national databases) greatly facilitate the exchange of information among the many participants in ICM and climate change programs.

• Many fields of science and engineering have provided reliable methodologies for assessing the performance and impacts of climate change and ICM programs. This linkage with science and engineering should be further strengthened to develop models for evaluating coastal processes and impacts as quantitatively as possible. In addition to the currently emphasized vulnerability assessments, more attention should be paid to strategies for responding and adapting to climate change and other activities affecting coastal resources.
The IPCC Common Methodology is a good example of a unified, coordinated approach to climate change and ICM problems. However, some of the methodology's suggested tools and techniques are still controversial. For instance, a number of coastal environments question the use of the Bruun rule for estimating the additional erosion induced by sea-level rise. Therefore, some models and parameters used in climate change studies and ICM assessments should be considered only as general tools. Users should take note of the specific areas of their verified applicability, and should avoid applying them indiscriminately to all environments.

• Decision-support tools should be developed by making maximum use of available resources. Wherever practicable, quantitative and economic valuation techniques of climate change- and ICM-oriented assessments should receive high priority because they create an objective basis for decision making among the various ICM partners.

• Consultation and feedback with coastal users, planners, researchers, and coastal communities should be considered important elements of ICM studies at every stage, to enable ICM stakeholders to reach early compromises and avoid unrealistic planning.

• Strengthening multidisciplinary cooperation should be based on an ICM common language because ICM involves many fields and specialties. Hence, some primary definitions, key words, and concepts should be agreed on as widely as possible to avoid misunderstanding in common actions. At the same time, program managers should ensure feedback and interaction with the processes of education and outreach, so that the integration of science and research in coastal management embodies wide circles of various communities. This issue is further addressed in Section 5 of these guidelines.

2.2 Related Points

In the context of general climate change and ICM programs, these guidelines note the following related points:

• Since the resolution of the current general circulation models (GCMs) is too low, scaling down GCMs

of regional climates may be one of the desirable directions for coastal countries to obtain local climate change estimates. To encourage this direction by effectively using scattered regional scientific resources, regional cooperation should be enhanced.

• Sea-level rise alone—either absolute or relative, including subsidence—is not an exclusive feature of climate change in coastal areas. Therefore, climate change studies should be broader, combining the effects of sea-level rise, storminess, atmospheric circulation change, precipitation, etc.

• The linkage of coastal management (through climate change or not) to hinterland development should be explicitly considered. Some countries are almost exclusively coastal, while others are narrow coastal strips with sparsely populated interiors, such as Senegal or Argentina. Decisions on the linkage and coordinated planning and research for ICM and interior planning should be well balanced within each country.

• Because coastal management takes place continuously in a dynamic environment, ICM action programs must be adaptive—i.e., responsive to changing conditions and new information. Being responsive requires a monitoring system to obtain information over time on variables that affect the choice of actions in the plan. Examples of variables that should be monitored include changes in sea level, precipitation, temperature, wind field, storm frequency and intensity, and land use, as well as the effects of various incentives on human activities.

Monitoring is likely to be conducted by a number of agencies at all levels of government, the private sector, and even nongovernmental organizations and private citizens. Agreement among the various monitoring groups on procedures, equipment, frequency, accuracy, and other factors is critical. In addition, the performance of ICM programs should be monitored regularly, with the results fed back into the program.

• In carrying out assessment activities related to climate change, nations should develop alternative, plausible scenarios and should assess all of their associated effects and implications. The objective would be to identify the net effects of climate change, which requires developing scenarios with and without climate change. Natural processes and human activities will continue to affect coastal areas with or without climate change. Some of these processes and activities may exacerbate the effects of climate change, while others may mitigate them.

3 Improving Institutional Capabilities

Crucial to the success of any ICM program is the ability to create the necessary financial resources required to improve existing institutional capabilities and their long-term operation. Financial mechanisms to support the goals of ICM are discussed later in Section 6. This section identifies the following major areas as needing strong institutional capabilities (Cicin-Sain and Knecht, 1997; World Bank, 1996):

- developing an interagency coordination mechanism,
- building ICM capacity at national and subnational (provincial, local) levels,
- building ICM capacity among nongovernmental organizations (NGOs) and communities, and
- enhancing capabilities for enforcement and voluntary compliance.

3.1 Developing an Interagency Coordination Mechanism

A single institutional entity rarely possesses the authority and resources to carry out the tasks of an ICM program alone. More typically, coastal areas are affected by the actions of a number of governmental agencies, communities, other stakeholders, and the private sector. Therefore, one of the key institutional challenges is to create a governmental mechanism that coordinates all of these interests effectively.

3.1.1 Attributes of the coordination mechanism

To be effective, the coordination mechanism should have the following attributes:

- It should have appropriate legal and legislative authority or should be properly authorized by the nation's Chief Executive (Prime Minister, President, etc.).

- It should be able to affect the actions/activities and budgets of all of the agencies/levels of government that have decision-making authority relative to coastal areas.

- It should be seen as a legitimate and respected part of the process.

- It should have access to appropriate technical expertise and data to facilitate informed decision making. Thus, this mechanism should foster communication between coastal decision makers and stakeholders, and physical, natural, and social scientists.

- It should be adaptive to include periodic updating and adjustments.

3.1.2 Main purposes of the coordination mechanism

The main purposes of a coordination mechanism are to:

- Provide policy guidance and standards for the ICM effort.
- Promote and strengthen interagency and intersectoral collaboration.
- Reduce interagency rivalry and conflicts.
- Minimize duplication of functions of agencies.
- Provide a forum for resolving conflicts among agencies, sectors, and communities.
- Provide periodic reporting of progress achieved, including evaluation and review.
- Recommend needed legislative and policy changes.
- Encourage the scientific community to develop multidisciplinary syntheses of scientific information that can support ICM decision making.
- Monitor and evaluate the progress of ICM projects and programs.
- Bring nontraditional stakeholders into the ICM process, such as indigenous people, NGOs, universities, scientific institutions, professional associations, the private sector, landowners, women's organizations, and youth groups.

3.1.3 Institutional options for designating the interagency coordinator

Several institutional options exist for designating the entity that should perform the interagency coordination function, including:

- Formally establish an interministerial or interagency council.
- Create a special coordinating commission or committee or task force.
- Appoint the national policy and planning agency (where it has overriding responsibility).
- Assign the function to the national council for sustainable development.
- Formally designate (through the Chief Executive or legislature) one of the agencies or ministries to act as "lead agency" and to oversee an interagency coordination process.
- Assist with coordination of compliance in meeting obligations under related international environmental treaties that a nation has ratified.

Deciding which agencies (existing or new) are best suited to carry out ICM-related functions is a key element in the design of an ICM process. This decision very much depends on the existing responsibilities and capabilities of the various agencies of government and other aspects of the government's organizational structure.

3.1.4 ICM office or entity

The interagency coordination entity typically oversees the implementation and operation of the ICM program. It may establish an operating arm, agency, or institution (an ICM office) that has general management and support responsibilities, particularly with respect to:

- coordination of planning and budget,
- environmental impact assessments,
- assessment of the cumulative effects of development projects,
- establishment of zoning schemes and implementation of other management actions,
- coordination of transnational and transboundary issues,
- political accountability, and
- identification of special areas to be protected.

3.2 Building ICM Capacity at the National and Subnational Levels

Whenever possible, it is important to develop ICM programs through a partnership that includes communities and national and subnational levels of government. Each of these levels of representation brings unique capabilities for ICM.

For example, the national government can provide broad guidance and standards for managing coastal areas, technical expertise, funding assistance, and ties to regional and global programs. Provincial and local governments and communities typically have the most detailed knowledge of the problems and the needs of coastal areas and their inhabitants, the best understanding of the limitations that will affect the choice of solutions, the best data and information on local coastal areas, and the support of user groups and the community.

Where limited institutional capabilities or resources prevent development of a national/subnational approach to coastal management, it may be desirable to begin ICM through a phased approach involving pilot or demonstration projects in specific coastal areas. In such cases, care should be taken to ensure that lessons are learned from the initial ICM pilot program, to enhance the likelihood that the pilot effort may ultimately be scaled up to include other coastal areas.

At times, it may be appropriate to delegate authority for ICM to local governments and communities. Institutional options important for planning, implementing, monitoring, and evaluating local ICM programs and projects—by themselves or in coordination with the other institutions—include:

- Local authorities with appropriate territorial jurisdiction—e.g., municipalities and protected area management boards.
- Local offices of national agencies with appropriate sectoral mandates.
- Local government of private-sector-owned and/or -operated coastal area development projects.
- Communities with traditional customs and property rights over the coastal area involved.
- Host NGOs that co-manage with the government a protected or conservation area, including coastal areas.

3.3 Building ICM Capacity among NGOs and Communities

How successfully coastal areas adapt to the impacts of climate change and sea-level rise depends on a collaborative agreement among government agencies, landowners, and the community. Identifying the most practical and appropriate strategies will only be possible through community-based ICM planning.

3.4 Enhancing Capabilities for Enforcement and Voluntary Compliance

The capabilities of national and local authorities to enforce laws and standards related to ICM projects, and of the private sector to comply with such laws and standards, may be enhanced by promoting:

- ICM policies, plans, programs, and guidelines through awareness-building about their importance.
- The use of a mix of regulatory and nonregulatory incentives as tools for implementation.
- An incentive system to improve the compliance and enforcement of ICM-related regulations.
- Efficient and effective local monitoring according to agreed-upon standards.
- Effective local administrative and judicial procedures and sanctions for violations and violators.
- Coordination of the enforcement activities of various agencies.
- Flexibility to allow for the use of feedback from evaluation and monitoring activities for redesigning and enhancing projects and plans.

4 Participation and Consensus Building

Since in many countries ocean resources and, to some extent, coastal resources are considered part of the public domain, it is imperative that the public and major stakeholders have a central role in planning, implementing, operating, monitoring, enforcing, and evaluating ICM plans and programs. It is the responsibility of government to ensure that appropriate and effective opportunities for such public participation are available.

This section defines: (1) the roles of the major stakeholders involved, (2) various modes of public participation that can take place, and (3) the process of consensus building that is essential to ensuring that decisions about the coastal area are ultimately implemented and adopted by the general population.

4.1 Modes of Participation

The public and major stakeholder groups should have opportunities for participating in all phases of the ICM process: problem assessment, priority setting, planning, implementation, monitoring and evaluation, and, where appropriate, enforcement (e.g., through citizen deputization). Modes of participation may vary according to the extent of authority being delegated—from direct management responsibilities of specific areas to consultative/advisory participation, including:

Roles of Major Stakeholders in Integrated Coastal Management

Stakeholders	Roles
Coastal/ocean users (e.g., fisheries, tourism development and recreation, aquaculture, military, shipping and port operations, mining, subsistence activities, and offshore oil operations)	• Articulate their special needs and concerns regarding coastal ocean space and resources. • Ensure stewardship of coastal ocean space and resources.
Nongovernmental organizations (NGOs) (e.g., women's organizations, religious groups, local and international environmental NGOs, and youth groups)	• Organize the community. • Work with citizens to assess their main priorities and needs. • Conduct community education programs. • Provide feedback to government agencies. • Monitor and manage resources. • Act as public advocates. • Provide extensive local knowledge about the quality and quantity of coastal resources and trends in their use.
Landowners	• Ensure stewardship of land and special habitats. • Avoid erosion, floods, and disasters.
Businesses situated in or near coastal areas	• Provide capital for development projects, facilities, and equipment. • Provide investments that lead to employment opportunities. • Pay taxes that can be used to help finance ICM.
Users of coastal and upland resources (e.g., agriculturists, foresters, loggers, and miners)	• Adopt sustainable, environmentally benign soil management and water allocation practices.
Universities, scientific institutions, and other educational entities	• Raise public awareness through outreach activities. • Provide data and information for making informed management decisions. • Develop special education and training programs at all levels.

- outright management of special areas through such measures as land purchase, lease, and management;

- co-management of specific areas or resources (where power is shared between governmental and nongovernmental entities); and

- joint public and private implementation.

4.2 Consensus Building

The process of consensus building, at a minimum, requires the following conditions to create the public acceptability that will ensure an ICM program's successful formulation and implementation.

- An informed general public through educational campaigns in the local language(s), as well as media

coverage of and public fora on the proposed ICM program.
- Availability of accurate, timely, and documented official information on proposed ICM activities.
- Adequate community participation mechanisms for input into ICM decisions and ongoing monitoring.
- Proper feedback mechanisms for incorporating the results of public consultations and evaluations into revised ICM plans.
- Open and transparent approval processes (e.g., permits and environmental impact assessments).
- Publication of the plans and actions taken in coastal areas, particularly the local and regional benefits derived from national coastal management initiatives.

5 Education, Training, and Outreach

Education, training, and outreach activities that target all sectors of society are essential components in the successful implementation of ICM and climate change action plans. However, many nations lack the resources necessary for building these components. Universities and training and research organizations should develop and strengthen programs of research, education, training, extension services, and technical assistance that will contribute to continuing ICM programs. These programs should combine theory and practice and should emphasize the application of research to address important coastal management issues.

- In many cases, ICM staffs will be small. Thus, individuals should have broad-based education and training, and a cadre of people should have postgraduate— preferably interdisciplinary—degrees. Master's degrees in coastal management are needed to provide the core intellectual curriculum for professional managers responsible for designing and directing ICM programs. This curriculum should include both the theory and the tools of coastal management and field practice.

- Regional training or educational centers may be a solution for some developing nations. There is a need to develop long-distance education through the Internet and correspondence courses, with appropriate curricula leading to recognized degrees.

- ICM programs require a team with skills in resource management and socioeconomics, ecology, geomorphology, coastal engineering, analysis of industrial and agricultural processes, financing, and institutional (including legal) analyses. Climate change also requires skills in meteorology, physical oceanography, earth science, geography, and predictive computer modeling. The most difficult skill to acquire is integrating the various aspects of analyses and defining priorities among them, and discerning the long-range implications of current actions. Training and education for ICM should be prepared on a multidisciplinary basis, so that trainees can become familiar with using all the scientific information related to ICM.

• Training institutions should be encouraged to offer programs that satisfy the immediate needs of practitioners. The target groups should include elected officials; religious leaders; national, regional, and local policy officials; user groups; the private sector; nongovernmental organizations; and educators.

• There is a need for a cadre of instructors. The priority should be to develop courses to train the trainers.

• Training is a continuous process and is preferably carried out in-country. Methods of training should be modified according to need and can take such forms as short courses, workshops, seminars, case studies, attachments, and internships.

• Donor-assisted projects should include requirements for providing training to host-country counterparts.

• Evaluation of training and appropriate career advancement should be a normal process to ensure retention of trained personnel.

• Feedback mechanisms should be built in to update training programs.

• Technology transfer is an important element in international environmental treaties and conventions. Equitable access to technology should be promoted through training and provision of equipment.

• Well-designed public education programs should use local languages and should target specific clientele—including elected officials, user groups, women's groups, school children, and the general public—to develop support for ICM and climate change action plans. Public education includes informal education programs that will reach all segments of the community, including the illiterate, who may form a significant segment of the stakeholder population.

6 Financing and Implementing Management Strategies

6.1 Creating Sustainable Financing Mechanisms

Crucial to the success and continued implementation of an ICM program is the ability to create the financial resources that are necessary, not only to initiate and develop the ICM program, but also to sustain the activities that are key to achieving the program's long-term operation and management objectives. A sustainable financial mechanism is essential to ensure measurable and positive effects of management and actions. The financial mechanism may take the form of a single financial arrangement or a combination of financial initiatives.

6.2 Integrating ICM Financing and Implementation Strategies into the General Framework of Coastal and Economic Development Planning and Management at Both the National and Subnational Levels

To minimize the need for additional resources and financing, ICM should be integrated into the general government structure to the maximum extent possible.

- Use of existing government mechanisms (such as zoning) that allocate land and water resources for specific development, conservation, or protection purposes can reduce much of the use conflicts that otherwise would have cost more in mitigation or restoration.

  As far as possible, coastal planning should be undertaken within the existing framework of government development plans, thus ensuring the inclusion in the budget of the needed costs of implementation.

- Agencies involved in developing ICM programs should be responsible for implementing the specific activities related to their functions, and should include adequate resource requests in their annual budget submissions.

6.3 Encouraging the Use of Cost-Benefit and/or Cost-Effectiveness Analysis to Demonstrate the Benefits of ICM Polices and Programs

Cost–benefit studies are often useful in identifying and quantifying for both public and private decision makers the benefits of ICM actions, as well as the most cost-effective approaches to management strategies. Today's tools for measuring the value of coastal resources, particularly "nonmarket" resources, make possible a more balanced approach to assessing the costs and benefits of ICM actions than in the past.

6.4 Using Economic Incentives to Induce Desirable Actions

A mix of positive and negative economic and noneconomic incentives, including regulatory instruments, has been identified for inducing desirable actions. Economic incentives, in particular, are useful in implementing the "polluter pays" principle. Because desired outcomes (e.g., changes in land and water use) and incentives to achieve them are interdependent, they should be identified jointly, and their costs and effectiveness should be evaluated simultaneously during the planning process.

Examples of economic incentives include:

- charges applied directly to pollutant discharges—e.g., emissions or effluent charges;

- charges applied to inputs to production or to product outputs;

- property/rights traded in open markets—e.g., tradable development rights, and emission or effluent permits;

- direct-use fees—e.g., for water supply and sanitation, and for access to protected marine areas;

- indirect-use fees—e.g., boat fuel, motor vehicle, coastal use, and environmental taxes;

- license and permit fees—e.g., for exploitation of renewable and non-renewable resources, for mariculture, for discharging wastes, and for recreational use; and

- resource rents—e.g., rental of coastal resources.

6.5 Forming Public-Sector/Private-Sector Partnerships

Financial resources are required to implement such governmental responsibilities as developing ICM action programs; conducting research, monitoring, and evaluation; providing technical assistance; and increasing public awareness through education and outreach activities.

Although financial resources for these responsibilities are usually implemented through governmental appropriations, substantial financial investment can be obtained through public/private contractual arrangements that do not require up-front government outlays. These agreements include industry "build, operate, and own" (BOO) contracts or industry "build, operate, and transfer" (BOT) to government facilities for waste management, co-financing conservation projects, cooperation to reduce discharge (such as voluntary agreement to reduce waste by the industries), and environmental industry development.

In some cases, many environmental management services (such as water supply and waste collection and treatment) that have traditionally been functions of the public sector may be privatized to encourage efficiency.

6.6 Developing Regulatory Measures

Incentives are needed to ensure compliance with environmental laws and regulations. Examples of regulatory measures include specification of technology (e.g., used in waste treatment), specification of performance (e.g., discharge limit, percent removal of pollutants), requirements for monitoring, and design standards.

6.7 Obtaining Direct Financing

A wide range of options for obtaining direct funding should be considered, including:

- Appropriations from general governmental funds—Money is allocated for capital and/or operating expenses from local, state, and national budgets.

- Revolving-loan funds—Money is allocated by government or other sources, including international financial institutions, to provide loans for constructing ICM facilities, responding to oil spills, etc. As loans are repaid, additional loans can be made.

- Dedicated funds—A percentage of tax revenues from one or more types of state or national taxes (e.g., cigarette tax, real estate transaction tax, hotel tax) is allocated to ICM.

- Donor funds—International or bilateral donor agencies provide funds to support ICM and/or climate change programs or related projects. Program evaluation should be conducted jointly between donor and recipient nations.

6.8 Obtaining Nongovernmental Financing

Nongovernmental sources of funds could be available, particularly for establishing exclusive areas or reserves to protect ecologically sensitive areas. These can include foundation grants, donations and memberships, souvenir sales, concessions, trust funds, debt swaps, and ecotourism.

6.9 Financing Disaster Management and Sustaining Preventive Measures Arising from Climate Change

Based on recent climate change studies, impacts in coastal areas (such as increased erosion, flooding,

and saltwater intrusion) are best dealt with within the framework of an ICM program. ICM should be regarded as one of the building blocks of the national climate change action plans and should be implemented with the other building blocks of those plans to achieve integration and effective adaptation to climate change. This can include funding from international sources, such as the Global Environment Facility, and other burden-sharing arrangements, as they become available.

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